```
function [h, display_array] = displayData(X, example_width)
%DISPLAYDATA Display 2D data in a nice grid
%   [h, display_array] = DISPLAYDATA(X, example_width) displays 2D data
%   stored in X in a nice grid. It returns the figure handle h and the
%   displayed array if requested.

% Set example_width automatically if not passed in
if ~exist('example_width', 'var') || isempty(example_width)
      example_width = round(sqrt(size(X, 2)));
end

% Gray Image
colormap(gray);

% Compute rows, cols
[m n] = size(X);
example_height = (n / example_width);

% Compute number of items to display
display_rows = floor(sqrt(m));
display_cols = ceil(m / display_rows);

% Between images padding
pad = 1;

% Setup blank display
display_array = - ones(pad + display_rows * (example_height + pad), ...
                       pad + display_cols * (example_width + pad));

% Copy each example into a patch on the display array
curr_ex = 1;
for j = 1:display_rows
      for i = 1:display_cols
            if curr_ex > m,
                  break;
            end
            % Copy the patch

            % Get the max value of the patch
            max_val = max(abs(X(curr_ex, :)));
            display_array(pad + (j - 1) * (example_height + pad) +
(1:example_height), ...
                          pad + (i - 1) * (example_width + pad) +
(1:example_width)) = ...
                                    reshape(X(curr_ex, :), example_height,
example_width) / max_val;
            curr_ex = curr_ex + 1;
      end
      if curr_ex > m,
            break;
      end
end

% Display Image
h = imagesc(display_array, [-1 1]);

% Do not show axis
axis image off
```

```
drawnow;

end
```